

## Performance of Different Varieties of Garden Pea (*Pisum sativum* L.) for Growth and Yield under Open Field Conditions

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### Abstract

A field experiment was conducted at the Agricultural Research Field of Rama University, Mandhana, Kanpur, during the rabi season of 2026 to evaluate the performance of eight garden pea (*Pisum sativum* L.) varieties under open field conditions. The trial was laid out in a Randomized Block Design with three replications. Significant differences were observed among the varieties for all growth and yield parameters. Pusa Pragati emerged as the superior variety, recording the highest plant height (89.50 cm), number of branches per plant (6.4), earliest germination (5.5 days), highest germination percentage (94.3%), earliest flowering (38.7 days to first flowering), longest pods (10.60 cm), maximum pods per plant (25.8), peas per pod (8.6), pod weight per plant (198.7 g), and green pod yield (12.40 t/ha). Kashi Mukti ranked second in performance. Economically, Pusa Pragati gave the highest net returns (Rs.2,30,000/ha) and benefit-cost ratio (3.87). The number of pods per plant showed strong positive correlation with most growth and yield traits. Overall, Pusa Pragati was found to be the most promising and economically viable variety for open-field cultivation under Kanpur conditions.

**Keywords:** Garden pea, varietal evaluation, growth parameters, yield attributes, open field, Kanpur conditions

**Introduction** Garden pea (*Pisum sativum* L.), a cool-season legume belonging to the Fabaceae family (2n=14), is an important vegetable crop valued for its high nutritional quality, rich protein content, and ability to improve soil fertility through nitrogen fixation. In India, it is a major rabi vegetable crop, mainly cultivated in the northern and north-western states. The country produces 5.8–6.2 million tonnes of green pods from 568–580 thousand hectares, with Uttar Pradesh being the leading producer. Globally, pea production

ranges between 18–20 million tonnes from 6.8–7.2 million hectares, with China and India contributing more than 60% of the total output.

The crop is rich in protein (23–33%), vitamins, minerals, and dietary fibre. In the subtropical climate of Kanpur region in central Uttar Pradesh, with sandy loam soils and limited winter rainfall, garden pea is commercially important; however, its productivity is often limited due to unsuitable variety selection. The present

study was therefore undertaken at Rama University, Mandhana, Kanpur during the rabi season of 2025-2026 to evaluate eight popular varieties of garden pea under open field conditions and to identify the most suitable variety for the local agro-climatic situation.

### Objectives

1. To evaluate growth parameters such as days to germination, germination percentage, plant height, branches per plant, and days to first and 50% flowering.
2. To compare yield attributes including pod length, pods per plant, peas per pod, pod weight per plant, 100-pod weight, test weight, and green pod yield.
3. To identify the most promising variety for commercial cultivation in the Kanpur region.

### Materials and Methods

The field experiment was carried out at the Agricultural Research Field, Rama University, Mandhana, Kanpur (Uttar Pradesh) during the rabi season of 2026. The soil was sandy loam with pH 7.8–8.2, low organic carbon content (0.35–0.55%),

and moderate fertility status. Meteorological data were recorded weekly from November 2025 to March 2026.

The experiment was laid out in a Randomized Block Design with eight varieties and three replications. The varieties tested were: T<sub>1</sub> – Kashi Nandhini, T<sub>2</sub> – Rachna New, T<sub>3</sub> – Kashi Samarth, T<sub>4</sub> – Pusa Pragati, T<sub>5</sub> – Matar Ageta-6, T<sub>6</sub> – Pant Uphar, T<sub>7</sub> – Kashi Samriddhi, and T<sub>8</sub> – Kashi Mukti. Plot size was 1.7 m × 1.0 m with a spacing of 30 cm × 10 cm. Sowing was done in the first week of November 2026 at a seed rate of 80 kg/ha. Recommended doses of fertilizers (FYM 10 t/ha, N 25 kg/ha, P<sub>2</sub>O<sub>5</sub> 75 kg/ha, K<sub>2</sub>O 50 kg/ha) were applied as basal (full P & K + half N) with the remaining nitrogen top-dressed at 30 days after sowing (DAS). Standard cultural practices including irrigation, weeding, and plant protection measures were followed. Observations were recorded on five randomly selected plants per plot. Data on growth and yield parameters were statistically analysed using ANOVA for RBD, and treatment means were compared using critical difference (CD) at 5% level of significance.

### Results and Discussion

## Growth Parameters

**Table 1: Mean Performance of Garden Pea Varieties for Growth Parameters under Open Field Conditions (Rabi 2026)**

Treatments	Days to Germination	Germination (%)	Plant Height at 90 DAS (cm)	Branches per Plant	Days to First Flowering	Days to 50% Flowering
T <sub>1</sub> – Kashi Nandhini	6.2	89.4	63.40	4.8	42.5	48.2
T <sub>2</sub> – Rachna New	6.5	87.2	60.50	4.5	44.3	50.6
T <sub>3</sub> – Kashi Samarth	5.8	91.6	72.80	5.6	40.8	46.9
T <sub>4</sub> – Pusa Pragati	5.5	94.3	89.50	6.4	38.7	44.2
T <sub>5</sub> – Matar Ageta-6	7.1	82.5	54.20	3.9	46.5	52.4
T <sub>6</sub> – Pant Uphar	6.4	86.8	69.60	5.1	43.6	49.8
T <sub>7</sub> – Kashi Samriddhi	6.0	90.2	71.20	5.4	41.7	47.5
T <sub>8</sub> – Kashi Mukti	5.6	93.5	86.70	6.1	39.4	45.1
S.Em (±)	0.28	1.45	2.10	0.32	0.85	0.95
CD (5%)	0.84	4.35	6.30	0.95	2.55	2.85
CV (%)	4.75	5.20	6.85	7.10	3.95	4.20

Pusa Pragati (T<sub>4</sub>) recorded the earliest germination (5.5 days), highest germination percentage (94.3%), maximum plant height (89.50 cm), highest number of branches per plant (6.4), and earliest flowering. Kashi Mukti ranked second. These results indicate the genetic superiority of Pusa Pragati for vigorous vegetative growth and earliness under Kanpur conditions.

## Yield Parameters

**Table 2: Mean Performance of Garden Pea Varieties for Yield Parameters under Open Field Conditions (Rabi 2026)**

Treatments	Pod Length (cm)	Pods per Plant	Peas per Pod	Pod Weight per Plant (g)	100-Pod Weight (g)	Test Weight (g)	Green Pod Yield (t/ha)
T <sub>1</sub> – Kashi Nandhini	8.40	18.5	6.8	145.6	720	21.5	8.20
T <sub>2</sub> – Rachna New	8.10	17.8	6.5	138.4	705	20.8	7.75
T <sub>3</sub> – Kashi Samarth	9.20	21.4	7.4	168.2	760	23.6	9.85
T <sub>4</sub> – Pusa Pragati	10.60	25.8	8.6	198.7	845	26.2	12.40
T <sub>5</sub> – Matar Ageta-6	7.20	15.6	5.9	120.3	650	18.4	6.10
T <sub>6</sub> – Pant Uphar	8.85	20.2	7.1	158.6	735	22.7	9.10
T <sub>7</sub> – Kashi Samriddhi	9.10	21.0	7.3	164.5	755	23.1	9.60
T <sub>8</sub> – Kashi Mukti	10.20	24.6	8.2	186.9	820	25.4	11.80
S.Em (±)	0.28	0.95	0.22	5.40	18.5	0.85	0.45
CD (5%)	0.84	2.85	0.66	16.20	55.5	2.55	1.35
CV (%)	5.40	6.25	5.10	7.30	6.80	5.95	8.10

Pusa Pragati produced the longest pods (10.60 cm), highest number of pods per plant (25.8), maximum peas per pod (8.6), highest pod weight per plant (198.7 g), and the highest green pod yield (12.40 t/ha). Kashi Mukti was the second-best performer. The number of pods per plant exhibited a strong positive association with overall yield.

### Economic Analysis

**Table 3: Economic Analysis of Garden Pea Varieties under Open Field Conditions (Rabi 2026)**

Treatments	Green Pod Yield (t/ha)	Gross Return (Rs./ha)	Cost of Cultivation (Rs./ha)	Net Return (Rs./ha)	Benefit Cost Ratio
T <sub>1</sub> – Kashi Nandhini	8.20	2,05,000	80,000	1,25,000	2.56
T <sub>2</sub> – Rachna New	7.75	1,93,750	80,000	1,13,750	2.42
T <sub>3</sub> – Kashi Samarth	9.85	2,46,250	80,000	1,66,250	3.08
T <sub>4</sub> – Pusa Pragati	12.40	3,10,000	80,000	2,30,000	3.87
T <sub>5</sub> – Matar Ageta-6	6.10	1,52,500	80,000	72,500	1.91
T <sub>6</sub> – Pant Uphar	9.10	2,27,500	80,000	1,47,500	2.84
T <sub>7</sub> – Kashi Samriddhi	9.60	2,40,000	80,000	1,60,000	3.00
T <sub>8</sub> – Kashi Mukti	11.80	2,95,000	80,000	2,15,000	3.69

Pusa Pragati recorded the highest net return (**Rs. 2,30,000 ha<sup>-1</sup>**) and benefit-cost ratio (3.87), confirming its economic superiority for commercial cultivation.

### Conclusion

The study concluded that among the eight varieties evaluated, Pusa Pragati performed best in terms of growth, yield attributes, and economic returns under open field conditions in Kanpur. It exhibited superior vegetative growth, earliness, and highest green pod yield. Kashi Mukti ranked second. Therefore, Pusa Pragati can be recommended as the most suitable and economically viable variety for commercial garden pea cultivation in the Kanpur region of Uttar Pradesh.

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